Why not borrow, invest, and escape poverty?

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The UN declared 2005 the ``Year of Microcredit,'' and the 2006 Nobel Peace Prize was awarded to Muhammad Yunus and the Grameen Bank for their contribution to reducing world poverty. There were high hopes that alleviating credit constraints would allow the poor to make profitable investments in small businesses and escape poverty. Less than a decade later, research started to show that access to low-interest credit, provided by the thousands of microcredit NGOs that were established, did not deliver as anticipated. A recent meta-analysis of this research (Meager, 2022) finds a precise zero effect of access to microcredit on poor households' businesses.

What went wrong? Perhaps, as argued by Banerjee et al. (2015), there is simply less potential for high-return businesses for the poor than anticipated by microcredit enthusiasts, maybe because of a lack of complementary factors such as proper training. Evidence indicates, however, that the poor did succeed in business creation when they were given the productive assets or the cash to make the investment (e.g., Bandiera et al., 2017, Handa et al., 2018). So perhaps the poor can run a small business and will do so, if the risk associated with borrowing is removed.

Consistent with this, Banerjee and Duflo (2011) describe in much detail how reducing risk plays a crucial role in the lives of the poor, and Banerjee (2000), in anticipation of the disappointing outcomes of microcredit, proposes that the poor are too risk-averse to borrow and invest. In his model, an investment project is subject to a fixed cost, and it succeeds with an exogenous probability. The poor, despite high expected returns, do not invest because they are too vulnerable to absorb the risk of failure.

However, Kraay and McKenzie (2014) survey the empirical literature and conclude that the evidence is inconsistent with technology-based (fixed costs or S-shape production function) poverty traps. To address this critique, Banerjee and Duflo (2011) propose that the poor do not borrow for the sake of investment in a business, not even a small amount they could afford to risk, because they believe, in spite of the facts, that production functions are S-shaped. This proposition may be true, but an explanation that is not based on false beliefs might be preferred, as this would be consistent with the claim – as also argued by Banerjee and Duflo (2011) – that the poor have a very good understanding of their economic environment.

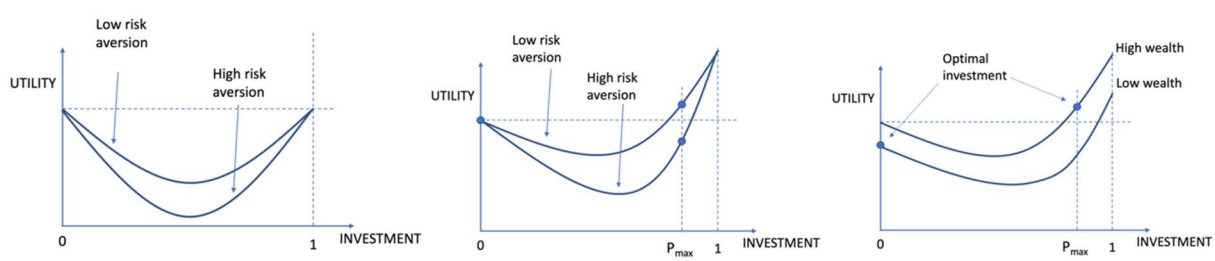
In Celik Katreniak et al. (2022), we propose such an explanation. We show that risk aversion can explain why the poor do not borrow, invest, and escape poverty when they have access to microfinance, without relying on an S-shape production function or any other non-convexity in the technology. We argue that the probability of success of a business isn't exogenous: investment is directed not just to increase the profit of the business if successful, but to a large extent also to increase the probability that it is successful.

We show in our simple model that when investment increases the probability that the business is successful, the expected utility of a risk-averse agent as a function of the sum invested is typically U-shaped. As a result, corner solutions emerge despite the absence of S-shape production functions.

Consistent with the evidence, the poor, who are highly risk-averse, choose zero investment, whereas the wealthier choose to borrow and invest. We test our model's predictions in an experiment and find that individuals tend to choose corner solutions when investment increases the probability of success and interior solutions when investment increases the profit conditional on success.

To understand the logic of the U-shaped expected utility, consider a lottery with zero expected return: with probability *p* the outcome of the lottery is a prize of one dollar, and with the complementary probability *1-p*, it is zero. The cost of generating a probability of success *p* is equal to *p* dollars. That is, with no investment the probability of winning the prize is zero, with an investment of one dollar the probability is one, and if the investment is half a dollar *p* is one-half, and so on. In this case, any individual is clearly indifferent between no investment and investing the maximum (*p=1*), where with probability one the agent simply receives the dollar invested back. The outcome is certain and identical in both cases. For any investment strictly between the two corners, the expected return is the same as for the two corners, but the realization is uncertain. Therefore, by definition of risk aversion, any risk-averse individual would strictly prefer the corners over any other investment strictly between zero and one. This rationalizes the U-shaped pattern (see Figure 1 Panel A).

To understand why the poor might avoid a high expected return investment that the wealthy would take, consider two changes to the lottery. First, the reward in case of a successful outcome is greater than one, so the expected return of the lottery is positive. Second, the investment is limited to be strictly below one, so success cannot be guaranteed by high investment. As Figure 1 Panel B shows, risk-averse agents would typically choose between one of the two corners, facing a tradeoff between avoiding risk (by not investing) and enjoying an expected positive return (by investing the maximum possible). If the reward is not too high and risk aversion declines with wealth, there would be a wealth threshold above which individuals invest in the project and below which they don't (See Figure 1 Panel C).



(A) (B) (C)

Figure 1. Expected utility and optimal investment choice under different risk aversion and wealth.

In contrast, if the probability of success is exogenous, as conventionally modeled, the expected utility of a risk-averse agent is a concave function of investment. The optimal investment increases with wealth (if risk aversion is declining with wealth), but the change is continuous.

For our online experiment, participants were recruited at random from a representative sample in the Czech Republic and decided how much to invest in three different games, with an endowment of 150 CZK (approximately 5.75 Euros at the time of the experiment) in each of the games. In the “probability game” the reward for winning was a prize of 270 CZK and the probability of winning was an increasing function of the participant's investment. In the “reward game”, the prize was determined by the investment of the participant: it was equal to three times the investment, and the probability of winning was one-half. In both games, participants lost the entire sum invested with the complementary probability and the expected return to investment was constant at 50%.

Figure 2 shows the distribution of investment in the two games when we limit the analysis to the risk-averse participants who understood the game. Consistent with the model's predictions, participants tended to choose the corners in the probability game significantly more than in the reward game. In particular, in the reward game, the distribution of investment was unimodal and in the probability game, the distribution of the investment (by the same participants) was bimodal with significantly more corner (or near corner) investment decisions (0 or 30 CZK and 120 or 150 CZK).

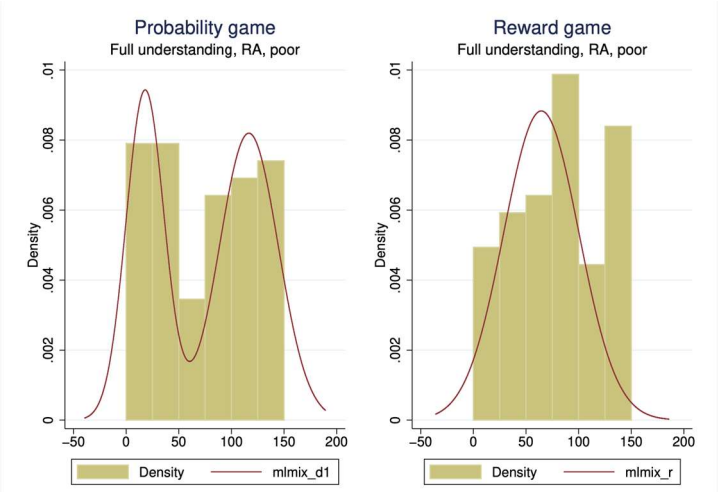


Figure 2. The comparison of investment decisions in the probability of return games.

The third game was a “step-by-step game” designed to test another prediction of the theory: when risk-averse agents could choose between investing in increasing the probability of success or in increasing the reward conditional on success, they chose to invest in the probability when expected returns are the same. Participants made four consecutive investment decisions of 30 CZK. In each step, they had the option to direct investment to increase the probability of success, or to increase the reward they receive if successful. Rewards and probabilities were set such that the expected return was constant at 50% in each of the stages for both investment options. Consistent with our theory, the risk-averse participants opted to increase the probability of their success, rather than increase the reward, in the majority of junctions. Specifically, about 70% of the risk-averse participants invested in increasing the probability in at least three of the four steps, whereas slightly less than 10% invested in increasing the reward in at least three steps.

Our main contribution is to propose a theory that could explain why the poor tend to turn down the opportunity to borrow for investment in their businesses. We hope that our theory and findings bring us a step closer to understanding the issue and provide some guidance to future empirical studies and policy decisions.

One avenue is policies aimed at risk reduction,[1] for instance, a policy of conditioning repayment of part of the debt on outcomes. However, it may be the case that trying to alleviate poverty by providing the poor credit to establish small businesses is simply futile. The poor are too risk-averse, and the lesson from developed countries is that the path to economic growth and reduction of poverty is more large and efficient businesses that create jobs that pay higher wages.

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[1] See the VoxEu column by Battaglia et al. (2018) who find that repayment flexibility improves business outcomes via risk-taking: https://cepr.org/voxeu/columns/repayment-flexibility-and-risk-taking-evidence-credit-contract

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